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Temp&Hum 4 Click

PID: MIKROE-2938

Smart environmental temperature and humidity sensor

Temp&Hum 4 click is a smart environmental temperature and humidity sensor Click board™, packed with features which allow easy and simple integration into any design that requires accurate and reliable humidity and temperature measurements. The sensor IC itself has integrated sensing elements placed on the bottom of the die, so they are not directly exposed to the environmental contamination, which translates to a prolonged life of the Click board™.

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Temp&Hum 4 click is a perfect solution for a wide range of applications that depend on accurate temperature and humidity readings. With its low power consumption and programmable interrupt requests capability, it is also a perfect choice for various temperature and relative humidity based IoT applications, such as smart home applications, smart

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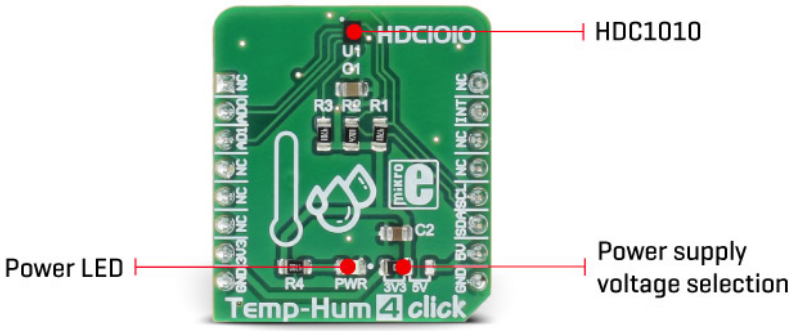
thermostats, gas sensing, smoke and heat sensors, and similar.

How does it work?

The sensor IC used on the Temp&Hum 4 click is the HDC1010, a Low Power Humidity and Temperature Digital Sensor from Texas Instruments. This sensor is factory calibrated to 2% relative humidity and 0.2°C temperature accuracy. It has an integrated heating element that is used to evaporate condensation, protecting the sensor that way. The heating element can be simply activated by setting a bit in the appropriate register. In the case when the heater is powered on, the power consumption might rise to about 130mA.



Internally, two sensors are connected to the ADC section, which can be set to sample the measurement with the resolution of 9, 11 or 14 bits, based on the measurement time. OTP memory holds the calibration coefficients that are applied to the measured value and the results are stored on the output registers, in the MSB/LSB format. These values are then used in formulas found in the HDC1010 datasheet so that the final temperature or relative humidity data can be calculated.

HDC1010 IC uses the I2C protocol to communicate with the host MCU. Its I2C bus pins are routed to the mikroBUS™ I2C pins and are pulled to a HIGH logic level by the onboard resistors. Two ADDR pins of the HDC1010 are routed to the CS and the RST pin of the mikroBUS™ and they represent the least significant bits of the I2C address. The final I2C address of this IC is determined by setting these pins either to HIGH logic level for 1, or a LOW logic level for 0.

Temp&Hum 4 click supports programmable interrupt engine, saving the host MCU from having to constantly poll the IC for data. An interrupt signal with a selectable polarity and behavior can be generated on the DRDY/INT pin of the HDC1010. It can be triggered by several event sources: it can be triggered by the temperature Lo/Hi threshold events, Humidity Lo/Hi events, as well as the readiness of the measurement data. Setting up the interrupts can be achieved by programming the appropriate IC registers via the I2C bus. More information about these registers can be found in the HDC1010 datasheet.

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HDC1010 IC is a very low power consuming device and it can work in two modes: sleep and active (measurement) mode. The device enters the sleep the mode as soon possible, to save power. While in active mode, measurement can be either automatic with predefined output data rate (ODR) or on-demand. In the automatic mode, the measurement is triggered in predefined time segments - continuously, while on-demand measurement happens whenever the I2C command is sent. As soon as the single measurement is finished, the device falls back to sleep mode.

Onboard SMD jumper is used to select the power supply voltage. This allows Temp-Hum 4 click to be used with both 3.3V and 5V MCUs.

The provided click board™ library contains simple and easy to use functions, which simplify configuring and reading of the measurement data. These functions are demonstrated in the included example application and can be used as a reference for custom projects. These functions can be used in mikroC, mikroBASIC and mikroPASCAL compilers for all MCU architectures supported by MikroElektronika.

Specifications

Type	Temperature & humidity
Applications	Environmental monitoring, home automation, weather stations, HVAC systems, etc.
On-board modules	HDC1010 Low Power Humidity and Temperature Digital Sensor
Key Features	The click board measures the relative humidity range from 0% to 100% with acc. of ±2%, temp acc ±0.2 °C, and it features an integrated heating element, used to evaporate condensation, smart sensor IC design, and low power consumption.
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on **Temp&Hum 4 click** corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
	NC	1	AN	PWM	16	NC	
I2C Address LSB 0	**AD0**	2	RST	INT	15	**INT**	Interrupt output
I2C Address LSB 1	**AD1**	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	

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	NC	5	MISO	SCL	12	**SCL**	I2C Clock
	NC	6	MOSI	SDA	11	**SDA**	I2C Data
Power Supply	**+3V3**	7	3.3V	5V	10	**+5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Temp&Hum 4 click maximum ratings

Description	Min	Typ	Max	Unit
Temperature Accuracy	-0.2	-	0.2	°C
Humidity Accuracy	-2	-	2	% RH
Operating temperature	-40	-	85	°C
Relative Humidity Operating Range	0	-	100	% RH
I2C clock frequency	10	-	400	kHz

Onboard settings and indicators

Label	Name	Default	Description
JP1	-	Left	Power Supply Voltage Selection: Left position 3V3, right position 5V
LD1	PWR		PWR indication LED

Software support

We provide a library for Temp&Hum 4 click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers and mikroSDK. The provided click library is mikroSDK standard compliant. The demo application can run on all the main MikroElektronika development boards.

Library Description

The library covers all functionalities of the click board.

Key functions:

float temphum4_getTemperature() - Read temperature form sensor

float temphum4_getHuminidy() - Read humidity from sensor

void temphum4_Configuration(uint16_t _data) - Configure sensor

Examples Description

The application is composed of three sections:

- System Initialization - Initializes I2C module and CS pin, RST pin as OUTPUT and INT pin

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as INPUT.
- Application Initialization - Initializes Driver init and settings chip mode ACTIVE and configuration measurement.
- Application Task - (code snippet) - Reads the temperature and humidity and logs to the USBUART every 500 ms.

The full application code, and ready to use projects can be found on our LibStock page.

Other mikroE Libraries used in the example:

- I2C
- UART
- Conversions

Additional notes and information

Depending on the development board you are using, you may need USB UART click, USB UART 2 click or RS232 click to connect to your PC, for development systems with no UART to USB interface available on the board. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

mikroSDK

This click board is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant click board demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Temp-Hum 4 click example on Libstock

Temp-Hum 4 click 2D and 3D files

HDC1010 datasheet

Temp-Hum 4 click schematic

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